

CLAIMS

What is claimed is:

1. A method, comprising:
detecting a degraded link among a plurality of feeder links, said plurality of feeder links being between a satellite and a corresponding plurality of gateways; and
switching from the degraded link to a diversity link, said diversity link being between the satellite and a diversity gateway located outside a service area of the satellite.
2. The method of Claim 1, wherein detecting the degraded link comprises:
measuring a degradation in a signal-to-noise ratio in a beacon signal received from the satellite at a particular gateway; and
recognizing that a feeder link corresponding to the particular gateway is the degraded link when the degradation exceeds a threshold.
3. The method of Claim 1, wherein switching from the degraded link comprises:
sending a switch command from a gateway corresponding to the degraded link to the satellite.
4. The method of Claim 1, wherein switching from the degraded link comprises:
receiving a switch command at the satellite from a gateway corresponding to the degraded link.
5. The method of Claim 1, wherein switching from the degraded link comprises:
re-routing data through the satellite to use a feeder horn corresponding to the diversity link rather than a feeder horn corresponding to the degraded link.
6. The method of Claim 1, further comprising:
detecting a plurality of additional degraded links among the plurality of feeder links;
and

switching from the plurality of additional degraded links to a plurality of additional diversity links, said plurality of additional diversity links being between the satellite and a plurality of additional diversity gateways located outside the service area.

7. The method of Claim 1, further comprising:
detecting that the degraded link has become a recovered link; and
switching back from the diversity link to the recovered link.

8. The method of Claim 1, wherein the plurality of feeder links comprise at least one of a plurality of forward links and a plurality of reverse links.

9. The method of Claim 1, wherein the service area comprises the continental United States and the diversity gateway is located in one of Baja, California; Sonora, Mexico; Chihuahua, Mexico; British Columbia, Canada; and Alberta, Canada.

10. The method of Claim 1, wherein detecting the degraded link comprises:
measuring an instantaneous received signal strength.

11. The method of Claim 1, wherein the diversity gateway is located in an area of low probability of high rain intensity.

12. The method of Claim 1, wherein the diversity gateway is located within a full angular coverage of the satellite.

13. The method of Claim 1, wherein the plurality of feeder links carry Internet traffic and the corresponding plurality of gateways and the diversity gateway each comprise an Internet access point.

14. The method of Claim 1, wherein each of the plurality of gateways supports K terminal beams.

15. The method of Claim 1, wherein detecting the degraded link comprises:
determining a signal strength of a feeder link beacon signal relative to received noise;
and
indicating that the feeder link is degraded if the signal strength is less than a threshold.

16. An apparatus comprising:
a plurality of feeder horns adapted to provide a plurality of feeder links between a satellite and a corresponding plurality of gateways, each feeder horn coupled to at least one data path;
a diversity horn adapted to provide a diversity link between the satellite and a diversity gateway located outside a service area of the satellite, the diversity horn coupled to a switch matrix; and
a plurality of terminal horns corresponding to the plurality of feeder horns, said plurality of terminal horns adapted to provide a plurality of terminal beams, each terminal horn coupled to at least one data path;
wherein the data paths are coupled to the switch matrix, and the switch matrix is adapted to selectively couple any one of the plurality of terminal horns to the diversity horn rather than a corresponding one of the plurality of feeder horns.

17. The apparatus of Claim 16, wherein each of the plurality of terminal horns supports K terminal beams.

18. The apparatus of Claim 16, further comprising:
a plurality of additional diversity horns, each adapted to provide a plurality of additional diversity links between the satellite and a plurality of additional diversity gateways located outside the service area, the switch matrix adapted to selectively couple any one of the plurality of terminal horns to any one of the plurality of additional diversity horns rather than a corresponding one of the plurality of feeder horns.

19. The apparatus of Claim 18, further comprising means for receiving switch commands which determine the operation of the switch matrix.

20. A method, comprising:

detecting a degraded link among a plurality of feeder links, the plurality of feeder links being between a satellite and a corresponding plurality of gateways, and each of the plurality of feeder links comprising a plurality of channels, the plurality of channels in at least one of the plurality of feeder links comprising at least one diversity channel; and

switching a plurality of degraded channels from the degraded link to a corresponding plurality of diversity channels in one or more of the plurality of feeder links.

21. The method of Claim 20, wherein the degraded link comprises both active channels and diversity channels, and wherein switching the plurality of degraded channels comprises switching only the active channels.

22. The method of Claim 20, wherein switching the plurality of degraded channels comprises:

re-routing individual ones of the plurality of degraded channels to selected ones of the plurality of diversity channels.

23. The method of Claim 20, wherein the plurality of diversity channels are distributed among a subset of the plurality of feeder links.

24. The method of Claim 20, further comprising:

detecting a plurality of additional degraded links among the plurality of feeder links; and

switching a plurality of additional degraded channels from the plurality of additional degraded links to a plurality of additional diversity channels among the plurality of feeder links.

25. The method of Claim 20, wherein detecting the degraded link comprises:

determining, at a particular gateway, a degradation in a signal-to-noise ratio in a beacon signal from the satellite; and

recognizing that a feeder link corresponding to the particular gateway is the degraded link when the degradation exceeds a threshold.

26. The method of Claim 20, wherein switching from the degraded link comprises: sending a switch command from a gateway corresponding to the degraded link to the satellite.

27. The method of Claim 26, wherein switching from the degraded link further comprises:

receiving a switch command at the satellite from a gateway corresponding to the degraded link.

28. The method of Claim 20, further comprising:

detecting that the degraded link has become a recovered link; and
switching back from the plurality of diversity channels.

29. The method of Claim 20, wherein the plurality of feeder links carry Internet traffic and the corresponding plurality of gateways each comprise an Internet access point.

30. An apparatus comprising:

a plurality of feeder horns adapted to provide a plurality of feeder links between a satellite and a corresponding plurality of gateways, each of the plurality of feeder links comprising a plurality of feeder channels, and the plurality of feeder channels in at least one of the plurality of feeder links comprising at least one diversity channel;

a plurality of terminal horns corresponding to the plurality of feeder horns, the plurality of terminal horns adapted to provide a plurality of terminal beams, and each of the plurality of terminal beams comprising a plurality of terminal channels; and

a switch matrix coupled to the plurality of feed horns and to the plurality of terminal horns, the switch matrix adapted to selectively couple any one of the plurality of terminal channels from the plurality of terminal horns, to the at least one diversity channel rather than a corresponding feeder channel.

31. The apparatus of Claim 30, wherein each of the plurality of terminal horns supports K terminal beams.